

Walnut
7882

No 6.

L. D. Walcott,
U. S. Geological Survey,

Sept. 5, " 1882,

Moved out of Kanab
& camped 10 mi. S. S. W.,
on the Kanab, Wash.,
just north of low
Permian cliffs.

Collected fossils
from the middle band
of limestone 5th & 6th.

Sept 6.

Went down the
Kanab, Cañon to
the upper Camb. l.

6/ Collected a few

fossils with E. S. H. ⁽²⁾
+ returned to the
Permian cliffs to
assist C. H. H.,
7.

Rode 10 miles west
along Permian
l- outcrop in search
of fossils with C. H. H.

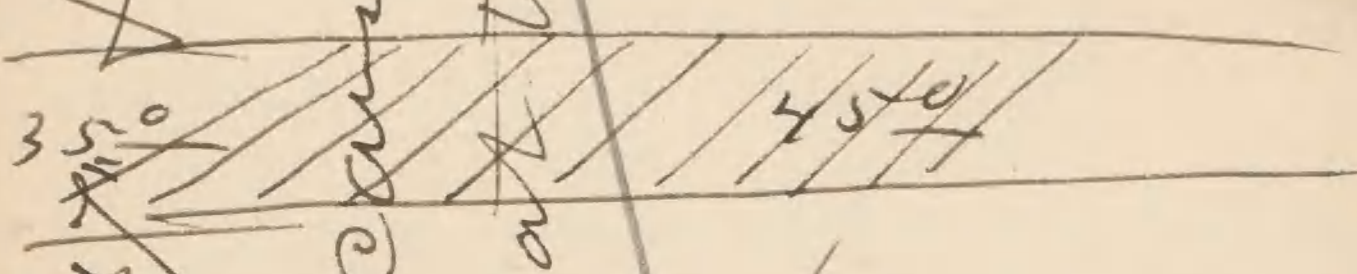
Mr. Hayden made
sketch of uncon-
formity at ~~summit~~ ^{middle}
of Permian.

8 (3)
With C. H. H. collected
fossils in Permian
l-
E. S. H. sketching.

9.
With E. S. H. rode
to the east of camp
5 mi. in search
of water, (none found)
and also took a
look at Permian
l-

10.
Moved camp to
Lower Kanab field

4
In the John or Canan
a light colored
stratum shown a
dip of 45° to the
cross bedded laminae.



Measured by
Slingometer Aug.
38 ft of water made.
Locality about 3 miles
above John or stone,
Permian dip 25°

5
Sept. 11"/82.

Went in to Kanab to attend
to errands & telegraph to
Washington.

Sept. 12/82

Busy all day cutting
up beef for drying.

Sept. 13/82

With C. H. H. out on
the Permian south
of Kanab, got collec-
ting fossils.

The double band of
limestone extends.

several miles to the
east or about to
the mouth of the
Johnson wash below
the Shinarump cliffs.
They retain the
characters given
in the section of 1879
& the same ^{species of} fossils
are embedded in
them along 20 miles
of outcrop.

Sept. 14

~~Attended to the road~~

Left the A. H. & E. S. H. L.
drive to head of
Cottamood Canyon thence
to Lenny Canyon & Kanab
to Kanab thro' the
Vermilion cliffs.

Sept. 15

Rainy day. at Kanab
& camp.

Sept. 16

Moved camp to
Johnson Canyon.

Sept. 17

A.M. Rode up Johnson
Canyon to examine
cross bedded sandstone

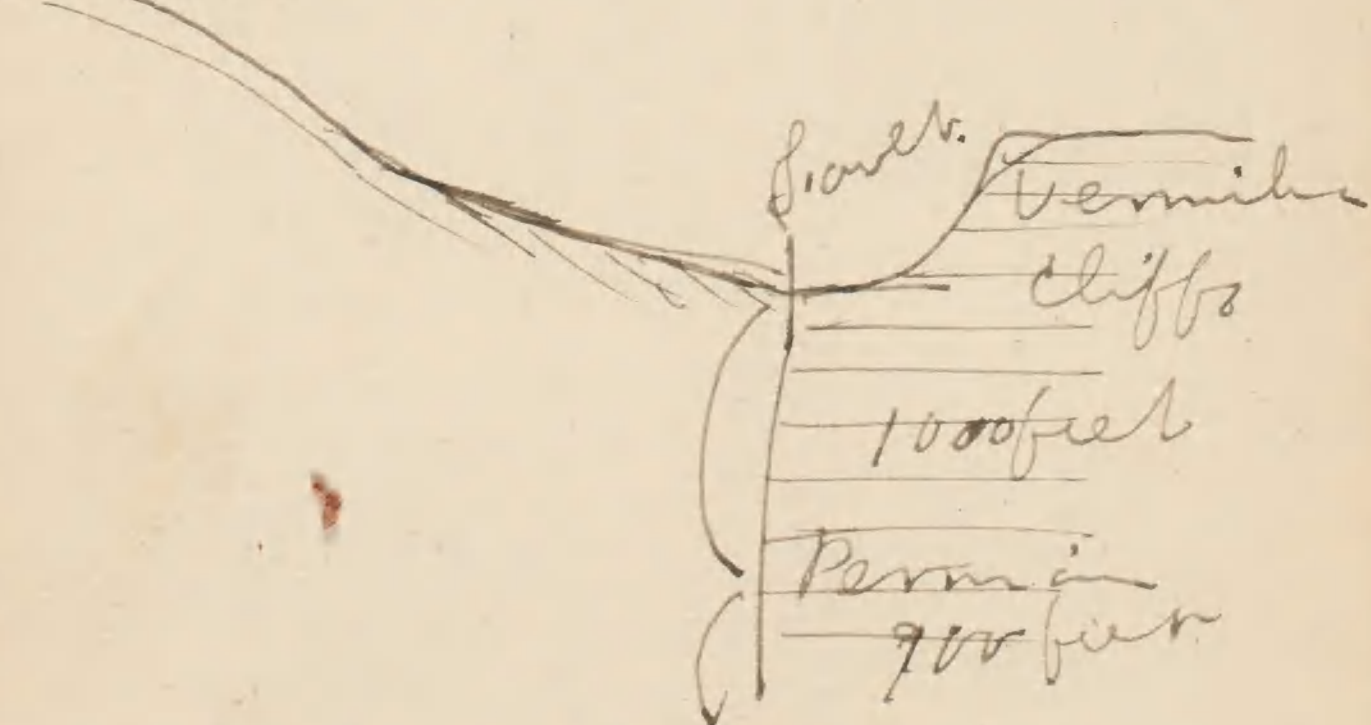
(See pg. 4) and after ⁸
lunch moved camp
to Navajo wells.

Sept. 18.

Crossed the Kaibab
Plateau to Horse Rock
Valley. Camping at
Horse Rock Spring.

On the road to the
east of Navajo Wells
noticed Permian
limestone below
Shinarump conglomer-
ate. Fine place
for a section.

Going south from ⁹
where the road
enters the H.R. Valley
the entire Permian
& portions of the
Trias are faulted;
dip before reaching
the Cambiferous
Kaibab

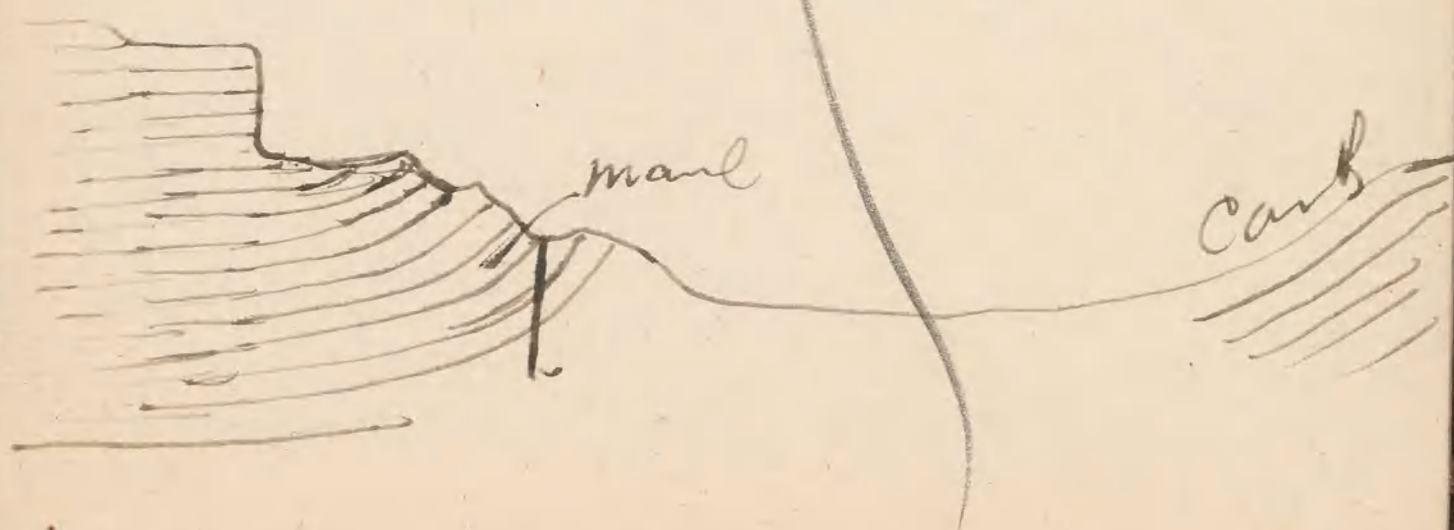


Sept. 19th L.

10

at Horse Rock Spring
the fish bed is well
developed in the Vermil-
ion cliff

A mile south of the
spring the cliffs dip
East at a low angle
20°. near the summit,
at the base the strata
rise up to the west and
show a section =



From the character of
the beds there are probably
local faults causing
a repetition of the beds.



The broad floor of the
valley is quaternary
& no connection is
shown between it &
the Carboniferous.

Crossed the valley
& found the Upper
Bellerophon Beds of
the Carboniferous

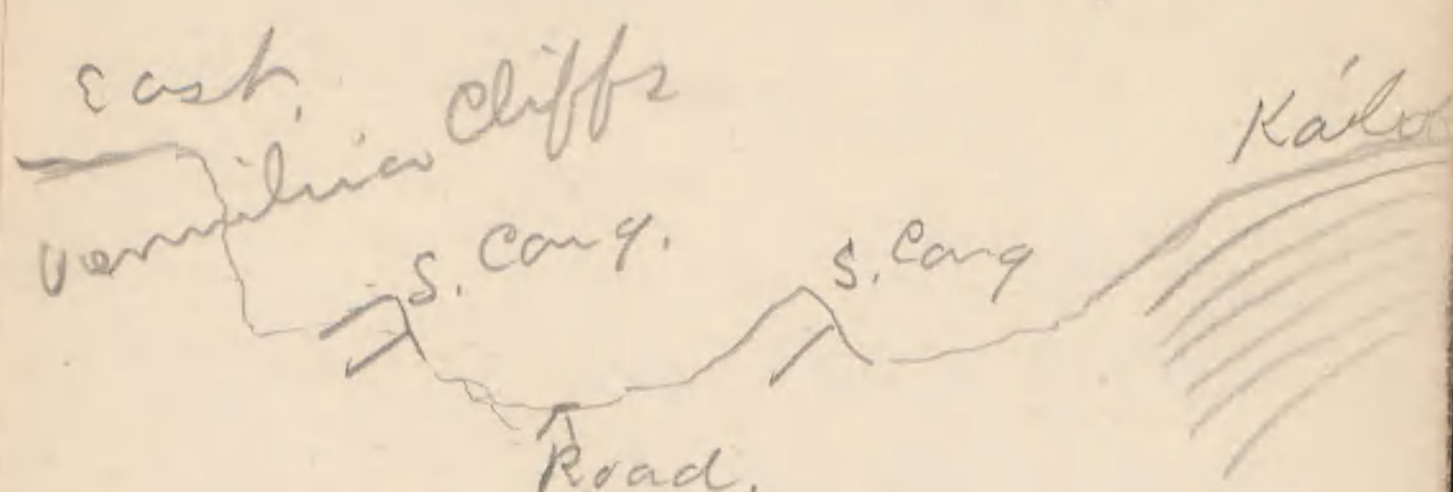
With Mr Hayden 12
collected a few good
specimens.

Over the Bellefonte beds
a peculiar deposit of
broken up fossils, small
angular fragments of the
limestone, ^{+ chert} below covered
by buff colored limestone
occurs. These condi-
tions of deposit, such
as noticed at same
horizon in Kanab cañon
in 1879.

Sept. 20/
Started N. from Horse
Rock Spring. About

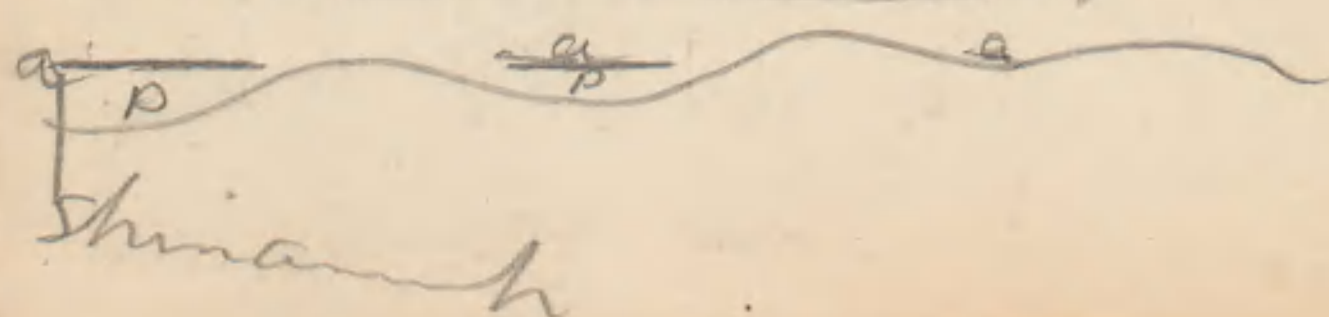
6 miles up the 13
valley two points of
Shinarump Cong-
appear in compara-
tively close relations
to the Carboniferous
limestone on the west
side. So much so
that the Permian
is probably faulted
down at this point.
The Conglomerate
does not appear again
for 8 or 10 miles when
it forms a ridge
or hogback in the
valley & also can

outcrop on the (14)
eastern side.



The Permian is here
faulted out in a
great measure.
At the Buckskin wash
22 or 23 miles from the
House Rock Shg the
Permian rests conformably
on the Carboniferous &
gives a section,
see pg. 16.

(15)
The eastern Kaibab
fault varies very
much. In places
there is scarcely a dis-
placement & in other
the displacement must
be at least 1000 feet.
This depends on the
projection of the
great snells of the
Carb - limestone
line of Permian cliffs



Sept 21st

16

On the N. side of the
Buckskin wash the
chocolate colored
Perrin shales overlie
the cream colored
P. carb. l. - and a
little less than 100
feet above (96) a
band of ~~sandy~~ yellowish
sandy limestone + "
l. - shaly, occurs and
carries *Myalina*, *Schizodus*,
Discina nitida, *Bakewellia*
+ fish plates & spines. At
one point this band
is 3 feet in thickness +

about 10 feet below (17)
a layer of sandy l.
3" thick occurs.

These beds are overlain
by petatata of chocolate
& faint colored shales
the thickness of which
owing to the faulting
along the line of the
Shinarump Cong. - was
not determined. At
another point a
half mile north a
band of sandy l.
1 foot thick contained
great numbers of a

species of Bakewellia (18)

This stratum appeared to be about 150 feet above the Carb. l.

The section of the Permian was not unlike that S. of Kanab. The marlites underlying the S. cong. are variegated in color & banded. The arenaceous-marls of a brownish-red & chocolate color extend down to the thin bands of l. carrying the fossils & the color of the marly beds & sandstone

to the Carboniferous (19)
l. remain the same.

~~25~~
The ~~Permian~~ Cong. retains its characteristic features & the strong deep chocolate colored sandstone beneath is very noticeable. Below this however, a belt of light buff ^{& gray} colored sandstone (25 ft) occurs which at a distance gives the impression of a double band of the conglomerate.

Continuing north to the peak in the Vermilion cliffs leading to the

16

Cañon of the Paria (20)
& the Term of "the
S-cong. & also the
Permian beds & the
beds above the Cong-
are alternately faulted
or eroded out of sight.
The fault cutting
first the one & then
the other according
as the erosion has exposed
the ridges or hollows
of the waves in the
strata.

Conglomerate

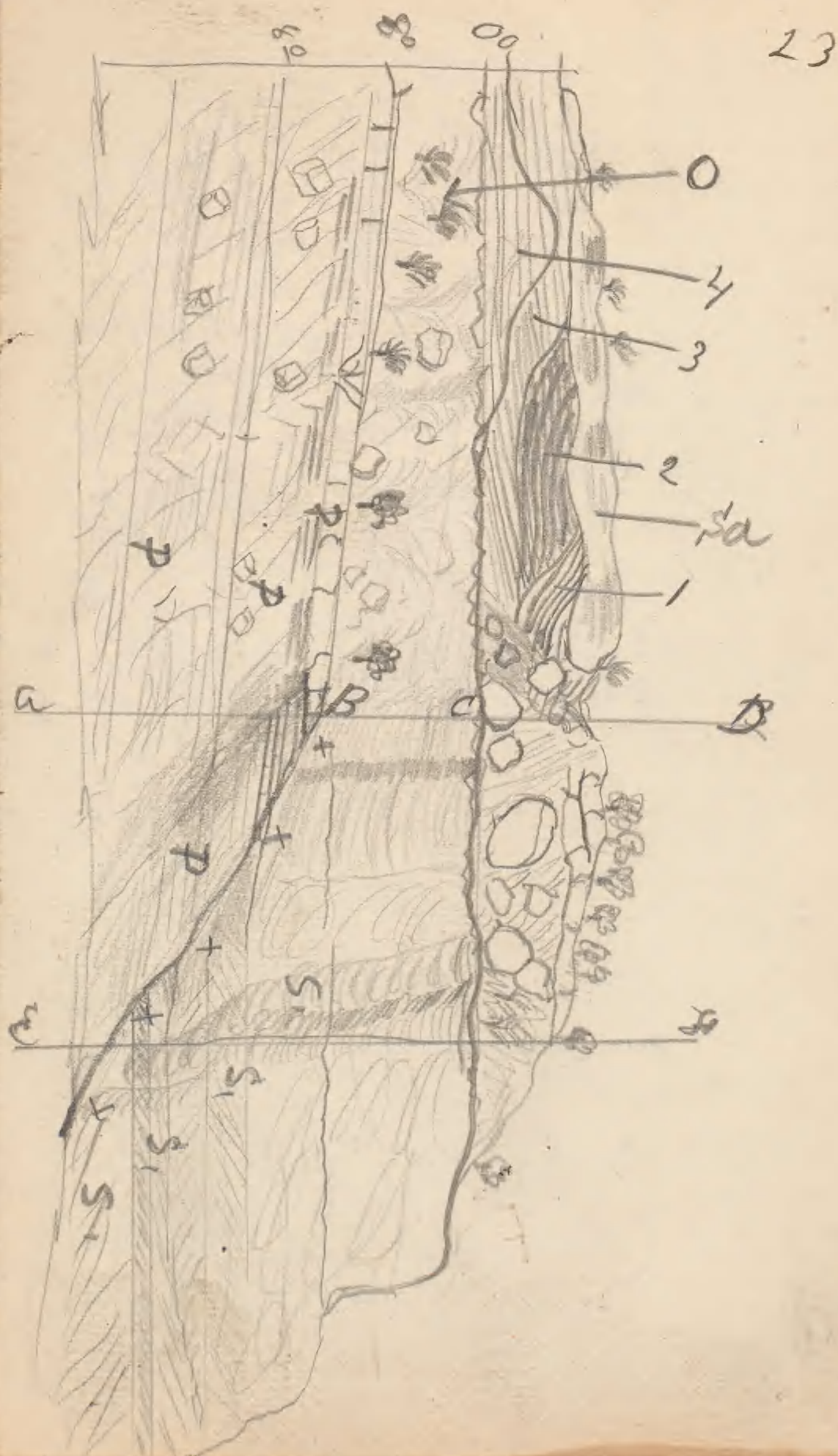
The same as on pg. 15.

The descent to Paria (21)
is thro' a ^{wide} cañon cut in
the marlites ~~above~~ the
S-cong. and the
lower beds of the
Permian cliffs. The
view of these beds as
lighted up by the
western sunlight is very
fine, excelling anything
of the kind I have yet
seen. Several hundred
feet of parti-colored
beds are eroded in
many beautiful forms
of buttes & cañon, &
sculptured in smooth
round knolls & projections.

Sept. 22^d

22

1899. *Reb.* 1/2 mile up the
 1895. *Reb.* entering the
 Vol. III. *Reb.* a cañon at Ponca
 Also h. 1725 from the S. W. (Hah
 which the road runs
 to Kanab) on the N. side
 of the cañon a strong
 conformity is observed
 between the chocolate
 colored layers of the
 Permian and
 the Permian Conglomerate.
 The following
 sketch illustrates it,
 Strike of Permian sd-
 54 W. Dip. 80 N.



16

p.p.p. = the Permian (24)
chocolate colored sand-
stones as they occur just
beneath the Shinarump
Cong. - along miles of
outcrop both in the
Kanab region & north
of Horse Rock valley.
Along the line a-b it
is 62 feet thick and
is mainly a coarse
sand altho' pebbles (Silicé)
occur near the upper
portion. At the
N.E. end of this
exposure there is
an old cliff xxxx
indicating a strong

surface erosion, (25)
against which
the sandstone S.S.S.
was deposited. The
bottom of this was
not reached owing
to the talus & dip
but 74 feet ~~was~~ added
to the thickness giving
136 feet to the Shinarump
at this point.
To the N.E. at O. the
Shinarump is still
thinner than at a-b,
not being over 40
feet.
above the Shinarump
at 1. 2. 3. 4. the

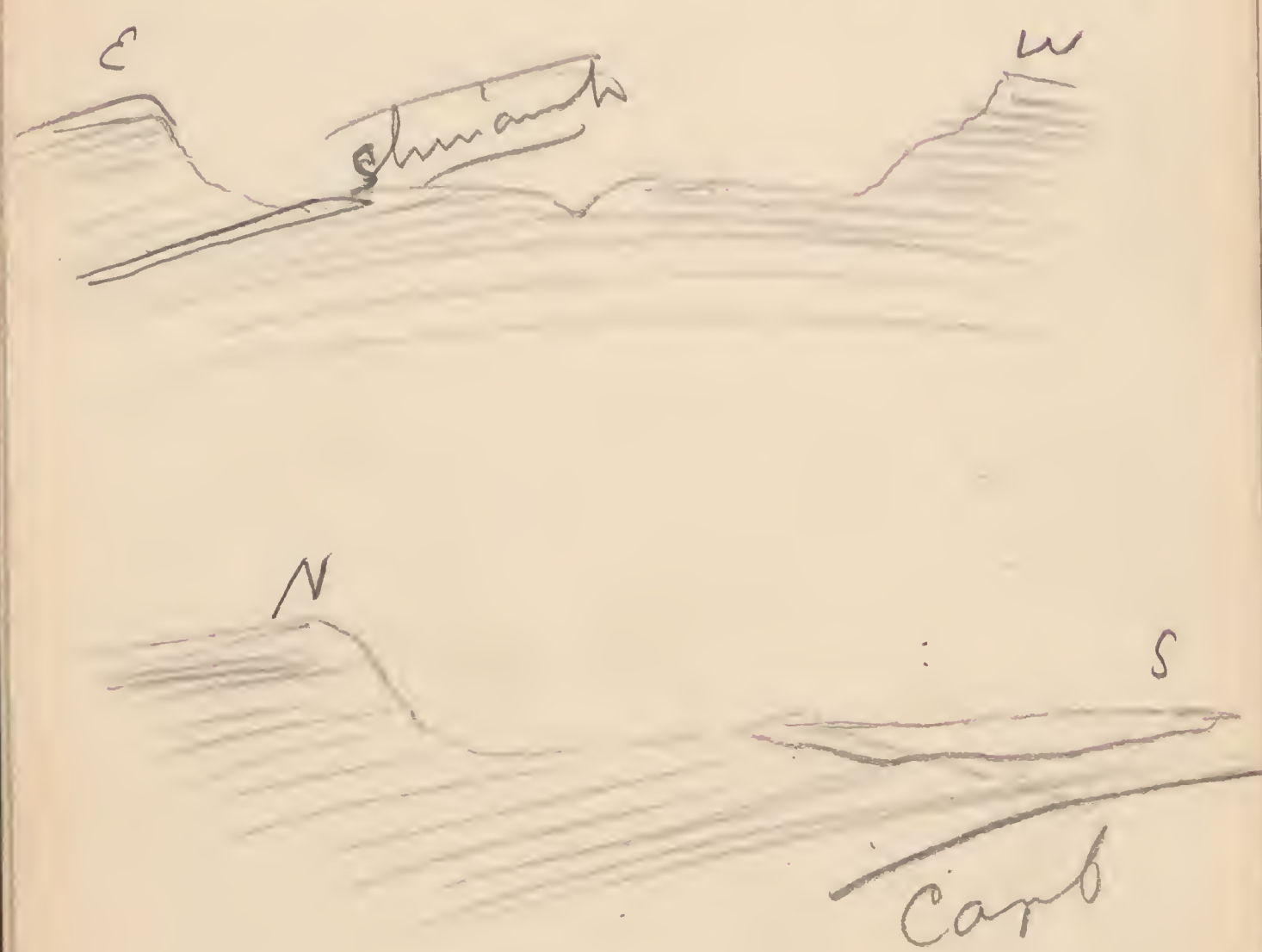
16
unconformity of 26
deposition of the
marls is beautifully
shown & even then
the deposit s.d. is
a conglomerate of
pieces of sandstone
silicified wood and
coarse sand. This
is of local deposition
as only a short
distance to the east-
ward the marls
rest directly on the
light colored shiv-
ers.

The line of strike
of the old Permian

Cliff is N.W. & S.E. 2)
& can be traced
plainly a half mile
to the N.W. where
another canon cuts
thru it & also to
the S.E. where it
is cut by the
opposite side of
the canon in which
a) the sketch is made.

About 200 feet of
the upper Permian
is exposed at the
deepest cut in the arch
from point to point

of the Vermilion 28
 cliffs caused by the
 elevation of the strata
 towards the Karibab
 Plateau from Pania



The section then is

1. Brown marls with 29,
 massive brown, chocolate
 colored sandstone
 bed above. 200 ft
2. Shumant
 40 to 140 ft
3. Marl & Brown sd. 0
 0 to 50 ft
4. Vanigated marls
 500 "
 measured 493. feet
5. Reddish brown sd
 to fish bed
 75 to 80 feet.

Vermilion cliffs above
 not over 150 feet to the
 white cliffs.

S.E. of the point where (30)
 the sketch is taken the
 strata of the Permian
 cliffs dip N.E. 15° and
 the section just taken
 is beautifully shown
 down thro' the marls
 (4.) and to the massive
 brown sd bed capping
 the Permian. The marls
 rest directly on this
 bed & there is no
 Shinanunb cong -
 present in its equivalent
 sd. Beneath the
~~massive~~ massive br
 sd. the succession of

marls etc, is the (31)
 same as beneath the
 Cong. These beds
 present many features
 showing shallow
 water origin:

Ripple marks; local
 unconformities of bedding,
 mud cracks & tracks
 of Gastropods &
 Annelids.

The thinning out
 of the Shinanunb
 south of the Permian

16

Cliff is a feature 32
connected with the
topography at the
close of the Permian
and as the Shin-
camp is thin all
along Horse Rock
valley & north it
leads to the view
that the elevation
of the Kaibab was
going on at that
time.

Sept. 23rd /82
Can. from p. 27. (a).

To the west of the (53)
point from which the
sketch was taken. The
conglomerate thins out
and lavender colored
marls come in between
it & the massive ~~red~~ bed,
& locally there is a
second light gray
coarse sandstone
about 50 feet above the
1st. This same feature
also occurs about 20
miles to the S.E. in the
N. end of the H. R. Valley.
Following along under
the Vermilion cliffs
towards Kaibab the
Shin-camp is only seen

occasionally as a 34
 gray sd. coming in
 on top of the massive
 br. bed. At the east
 base of Cone point
 the double bed of
 sd. comes in again
 for a little way &
 then for some distance
 the Shinarump is
 entirely absent.

The Shinarump is
 not seen again
 until the west side
 of the great butte at
 the mouth of —
 — canyon is
 reached. There it
 is developed as

a bed about 20 (35)
 feet thick and
 rests on the massive
 brown sd. bed. The
 latter bed is not
 always present
 where the cong.
 is absent as the
 upper marls rest
 on those below,
 with the exception
 however of the
 locality near Paria
 the massive brown
 sd. bed was always
 seen beneath the
 cong. It varies in
 thickness the result of a
 slight erosion on

16

its upper surface. (36)
On west to Kanab
and beyond the
cliff is unbroken except
by recent erosion or
faulting.

Sept. 24" — Sunday
(Narajowells.)
In looking over Mr
Gilbert's section at the west
Pania creek I find that
he mentions the thinning
out of the Shinanup
Conglomerate from 75
to 0, but that the
Cong- rested on the eroded
surface of the gypsiferous
clays below. On p.
175 he refers this to the
erosion of the current

which Sept. 11. 1895.

spreading the Cong- (37)
In many instances this
is undoubtedly correct
as is shown south of
Kanab, but the cliff
at Pania I would attribute
to aerial erosion and
not to the current alone.
The absence of the
Shinanup Cong- on
the line of the Kaibab
uplift is measurably accounted
for by the theory mentioned
on p. 32. of this note book.

Fossil localities below
Shinanup Cong. mentioned
by Gilbert & H. Bull. p. 176.
p. 285.

Perry - Cont. p. 177.

Morrison p. 213.

Sept. 25/82

38

Endeavored to get a section from the Carboniferous to Shinarump but could not do so satisfactorily. Went east of Navajo wells 5 miles. C. H. H. collected a lot of fossils in the Permian l. which is here most strongly developed in the upper bed. Asst him for a time.

Also found a few
b) poor fossils in the Permian Carb.

Sept 26,

(39

Went in to Kanab to refit & make shelter tents etc

Oct. 1st. Moved camp to Lower Kanab field.

Oct 2nd

With C. H. H. collected a lot of Permian fossils in the l. - south of Kanab 6 miles. Found Goniatites, Nautilus etc. Saw on these beds

Oct. 3d

40

Rode along Shivianh
cliff E & W of Kanab
gap.

Noticed portion
of silicified water
worn tree 3 feet
in diameter.

(Measured conglomerate
with tape line
found it to be
47 feet on E. side
Kanab gap.)

(Noticed many traces
of coarse picroids
and also annelid

formings in the (41)
sandstone immediately
over the conglomerate

Oct. 4th

Moved camp to
Pipe Spring.

Noticed a reddish
brown crinoid limestone
in Permian clays about
300 feet below Shivianh
conglomerate,
3 mi. W. Kanab wash.
No fossils.

Oct. 5

With E. C. H. collected
a lot of Permian

Fossils 8 miles (42)
 a.s. Pipe Spring. There
 appears to be but one
 stratum of ls 3 or 4
 feet in thickness.

This outcrop of
 Permian ls which
 has been uninterrupted
 from the Kanab wash
 crossing except by
 a few places of erosion
 is cut off S. of Pipe Spg.
 by the Long valley
 fault & the Shin-
 a-rump cong is ls
 dam almost against

it
 Shin
 Shin
 43
 S.E.
 Shin
 Permian
 Section marked on map.

a strongly marked
 unconformity by erosion
 is shown beneath the
 Shinarump cliff S.S.W.
 of Pipe Spg. The brown
 chocolate Permian
 sandy shales are cut
 into 30 feet and this
 irregular line is
 shown in several places

30 20 10 0 10 20 30

Oct. 6

44

With E. C. H. & C. & A.
collecting fossils
in Permian l. at
same locality as
yesterday 7 mi South
Pipe Spring.

Oct. 7th

Section of Permian
S.S.W. of Pipe Spring
Starting 15 mi S.S.W. of P. Spg.
1 Estimate of sandstone
(Brown) & arenaceous &
gypsiferous clays &
fossil bearing l. - 150

2. Shaly - light col. (45
l. - carrying numerous
fossils. Str. N. 75° E. Dip 1 1/2° N
Myalina. Murchisonia
etc. etc. 5 feet.

3. Brown sandy clays
with more or less
gypsum. 245 "

4. Light chocolate brown
alternating with
drab, arenaceous &
gypsiferous clays.
Dip 75- 335

5. Brown, chocolate col.,
passing into Br. Ch. - gyp.
clayey shale & d. with
massive layers of
red mudst. of thickly

laminated layer
Dip $1\frac{1}{2}$ N. 15° W. 287.

(46)

Shinarump Cong.
65'
to clear weather
summit layers.

The distance from
the Carb - l - to
the Permian is
mainly a level
plain so the thick-
ness was estimated
think however that
150 feet is under
rather than over
the true thickness.

The upper part of 47
of No 4. is a drab
colored arenaceous
clay passing into
sandstone near the
top. Gypsum is found
throughout 4 and often
forms thin layers
 $\frac{1}{4}$ " to 1" in thickness.
~~Returned to base of the 8th~~

~~See Note Book No~~
~~7 for interval~~

Note on Permian (48)
Fauna

The peculiar fauna
of the Permian l-
is undoubtedly owing
to the physical condi-
tions during the depo-
sition of the sediments.
a sea depositing a
mixture of clay and
sand & only clear
locally for the
deposition of an
inherent limestone

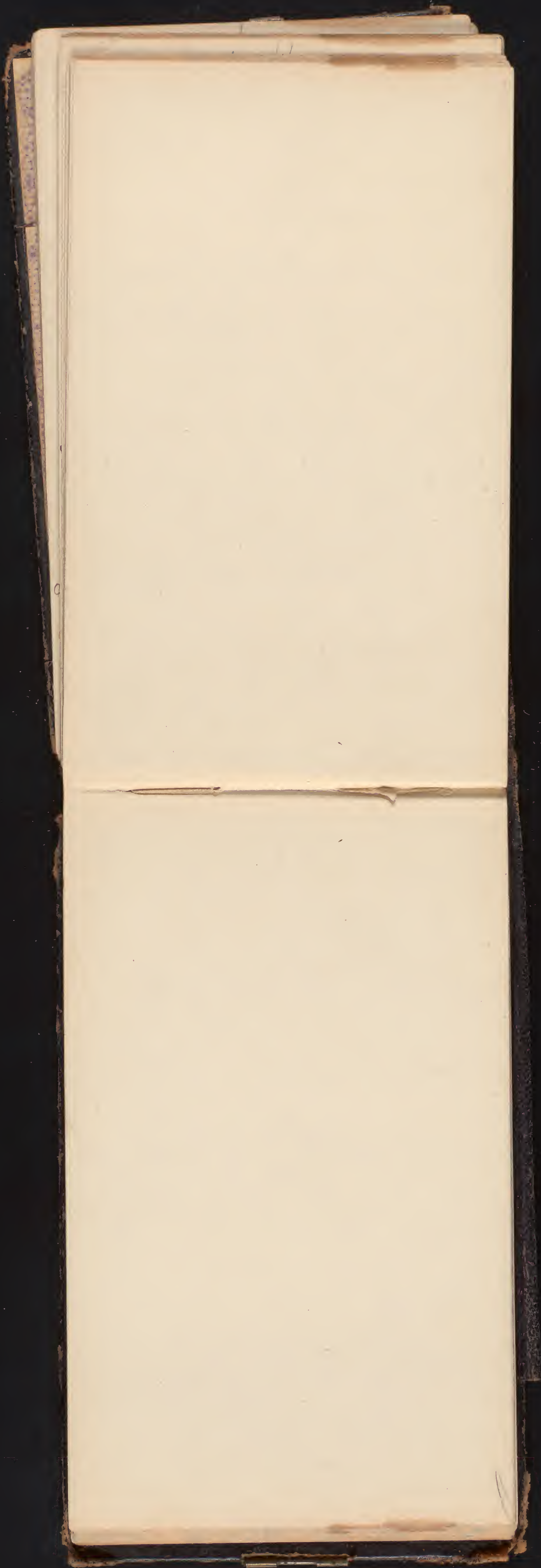
on sandstone would (49)
only allow of the growth
of forms capable of
living under such
conditions and
the Mytilus & Cardium
families are represented
and the former largely
developed. Both
of these are represented
in the strong saline
waters of the Caspian
sea at present and
we also noticed them
in the muddy &

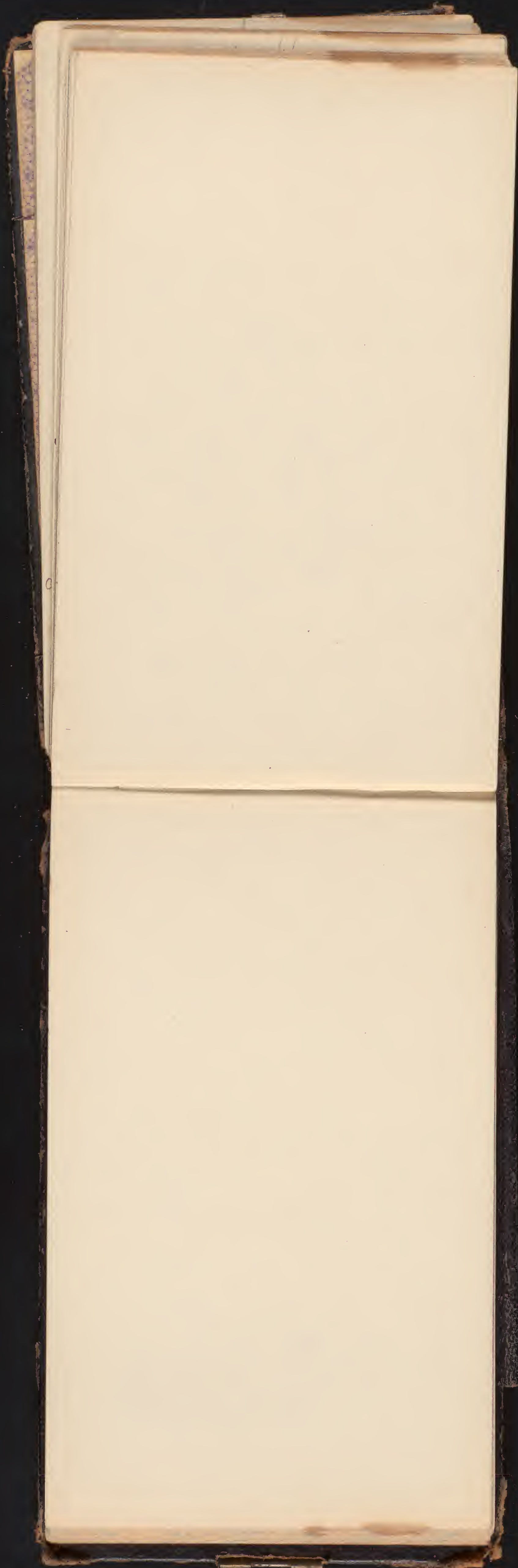
arenaceous deposits (50,
of the lower portion
of the Aubrey group.

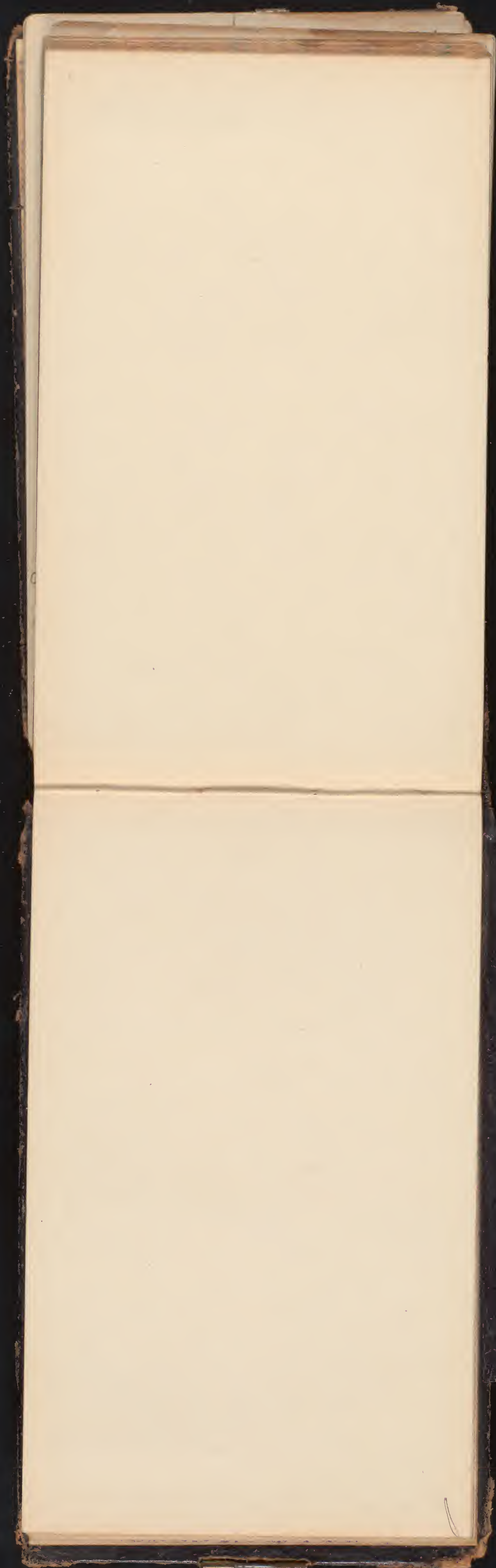
In the Permian l-
Brachiopods occur but
they are exceptional
& probably spread
from some locality
where limestones
were in continuous
deposition. The
subject of the origin
of the Colorado Permian

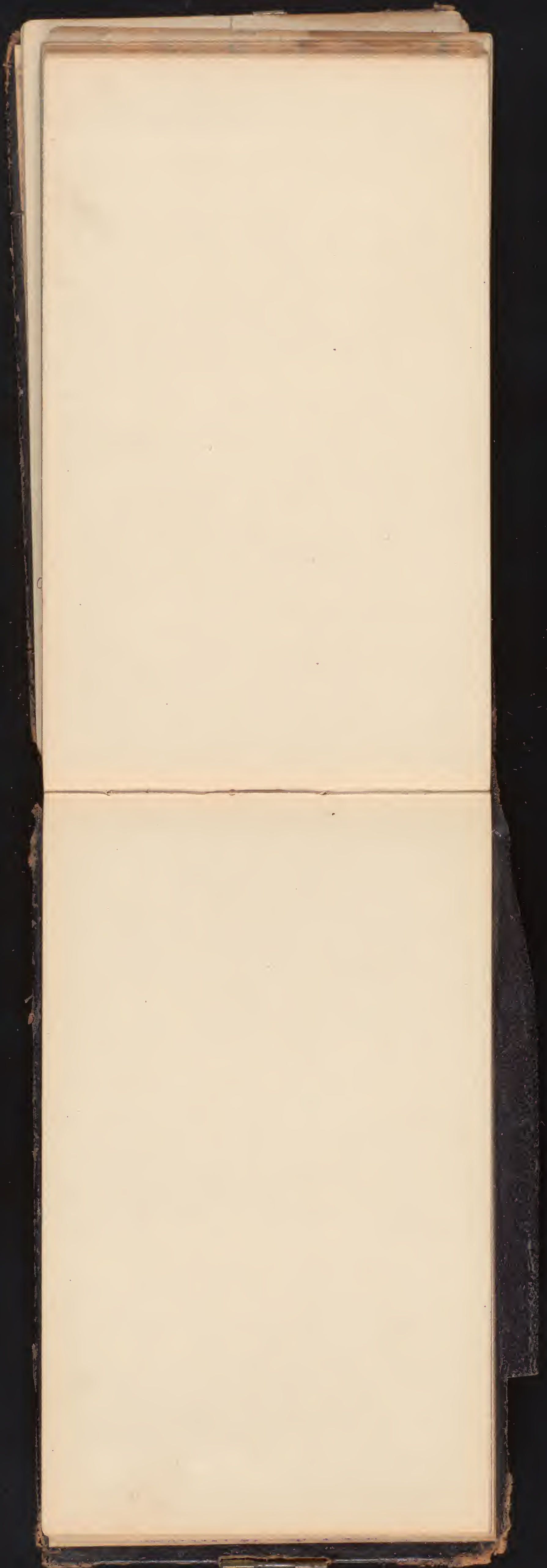
fauna is one of (51
interest & will proba-
bly be found to the
eastward of the
Colorado river.

In studying Permian
fauna refer to the
fauna just above
the Aubrey l-., as
it possesses some
points in common.









" Boxes sent in from
Milford. Utah.

To No 17. sent from
Merada

No 17:

~~10. PKg. Permian.~~

~~7 " Fish (Lias)~~

No 18)

~~21. PKg Permian~~

" 19) ~~9. PKg. Carb.~~
~~6 To Fish (Lias)~~

" 20)

~~14. PKg. Carb.~~

" 21)

~~17~~

"

"

~~1~~

"

~~Permian~~

" 22)

~~10 PKg. Carb.~~

" 23)

~~—~~

" 24) 14. PKg. Lithologie
Grand Caen

" 25 17. Lantz fossils
ditto

" 26 14. Lithologie
ditto

27. 4. Lithologie
 11. Fossils.
 Grand Canon

Pennin section

No. 3.

Distance 7015 feet.

Rise

63 feet.
 182
 245

4, Distance 1000. ft

Rise

1st 2c

260.

2^d Distance, 5250 "

120

380

B40.

2871		
580		
867.	130	
	265.	
220		
66	26	260.
280.	6	75
	150	335

Base of Shinarump in Hallam

No 1. 5450.

" 2 ~~5300~~

Ditto on massive chert layer

No 1. ~~5500~~ 5475

" 2. ~~5800~~ 5500,

" Summit of Cong.

No. 1. ~~5500~~ 5550

" 2 ~~5800~~ 5550

$$\begin{array}{r} 26 \\ 7 \\ \hline 182 \end{array}$$

$$\begin{array}{r} 33 \\ 5 \\ \hline 185 \\ 22 \\ \hline 187 \end{array}$$

$$\begin{array}{r} 264 \\ 22 \\ \hline \end{array}$$

$$\begin{array}{r} 245 \\ 335 \\ 287 \\ \hline 867 \\ 1 \end{array}$$

1430
2150.

$$\begin{array}{r} 11 \\ 55 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 12696 \\ 58 \\ \hline \end{array}$$

62 feet up the Cong.

13 ~~104~~ 88

68 184 4.

9 23 87

74 115 5

62 15 435

136. 130. 70 58

493

March,

85.

12.0

1 - 5475. ~~174~~

1 - 6100 230

625

600.

25

